NRCS Natural Resources Conservation Service

Tree/Shrub Establishment – Direct Seeding

WV Conservation Practice Job Sheet *Code 612*

Definition

Establishing woody plants by direct seeding.

Purpose

To establish woody plants for forest products, wildlife habitat, erosion control and improvement of water quality, treating waste, reduction of air pollution, sequestration of carbon, energy conservation, enhancing aesthetics and/or improving or restoring natural diversity.

There are severe limitations on the use of direct seeding. It does not yield consistent, satisfactory results and should not be considered as a large scale substitute for tree/shrub planting. Careful control of seed storage and treatment is necessary. Loss of seed to rodents and birds often presents a problem. This information provides a basis for discussion with landowners who express an interest in the practice.

The following species have been successfully established using direct seeding: Black Walnut, Oak, Hickory, Persimmon, Kentucky Coffeetree, Ash, Maple, Basswood, Sycamore, Sweetgum, Hackberry, Black Cherry, Yellow-Poplar

Seed Collection /Purchase

Scout potential collecting sites during mid to late summer to determine the potential seed crop by species. Best collecting sites are areas of mowed grass where mechanical seed harvesters can be used. Make plans for collecting, bagging, floating, sorting and storing seed before seed fall begins (usually in September and early October).

Note that seed may also be purchased from reputable suppliers. For more information by species see Illinois Direct Seeding Handbook at:
http://www.il.nrcs.usda.gov/technical/forestry/dshndbk.html

Seed Inspection, Care, and Storage

Only undamaged, viable, mature seed will be used. Inspect by species at least 10 randomly selected seed per bushel. All seed should be inspected by performing a cut test or crack test. Collected seed can be inspected during the sorting process; purchased seed should be inspected at the time of delivery. Look for filled, moist, light-colored seed.

They following are key points to success:

- Early seed drop is suspect and often has low viability compared to later collections.
- If a variety of species are to be planted, be advised that all the species are not likely to fall and be available at the same time.
- Do not delay or postpone collection activities.
- Keep nuts and fruits collected in a cool, protected place, out of direct light.
- Organize seed processing area for efficient use.
- Do not let seeds and nuts dry out or heat up before processing.
- Watch out for excessive heat generation and mold formation. Avoid tall stacks.
- Tag or label all bags of species and lots individually and maintain separation.

The following are recommendations for some species:

Ash

Place in shallow trays in ventilated areas to dry. When dry, crush and separate seed from debris. Sow about ½ inch deep before the end of October, if possible.

If storing, place in dry closed containers and place in cooler at 40°F until planted.

Black Cherry

Immediately after collection, crush and mash fruits through a wire mesh to separate seeds from skins and pulp. Wash seed into a shallow box. Rub as you wash. Seed to be used within a few weeks or months should only be surface dried (a few hours), then bagged in sealable plastic bags and placed in a cooler until planted. Seed to be stored over winter should be dried at room temperature only about 1 day. Place in 4 mil sealable bags and lay flat in a cooler at about 40°F. Check and rotate bags occasionally to be assured seeds are not molding. Seed can be surface spread fall or spring in areas with loose soil. If mechanically seeded, plant only ½ to ¾ inch deep.

Hickories (all species)

After collection, keep nuts in an area that is protected from squirrels and where drying will be slow. Remove hulls, other debris, and insect damaged nuts by hand. Fall plant as soon as possible at about 2 inches deep with good soil contact. Any nuts to be stored should be air dried, placed in airtight containers, and placed in a cooler at 36° to 40°F. Pit stratification is an alternative storage method if space and conditions permit. Soak for 2 to 4 days, then bury at least 2 feet deep. Obtain specifics for this method from the references listed.

Oaks (all species)

After collection keep in a cool, shady area in burlap or loose weave onion bags until separation from debris and inferior seed. It is best to process acorns of the white oak group right after collection due to their tendency to sprout. To restore normal moisture content, soak acorns in a large tank or tub for at least 4 hours within 24 hours of collection. Plastic children's wading pools are inexpensive containers for soaking acorns. "Float-off" inferior seed, caps and other debris. Note that bur oak and overcup oak acorns will float. These species must be hand sorted. Hand-sorting of floated acorns greatly increases seed quality.

Plants seeds as soon as possible or bag in burlap or fine weave onion sacks and store in a cooler at about 40°F.

Check condition regularly, particularly for moisture and sprouting. Sprouted acorns are okay, but more susceptible to dehydration.

Any acorns to be stored over winter must be moist. Acorns in the white oak group should be planted as soon as possible in fall, do not try to store more than 6 months. Other species can be stored up to 3 years.

Soak about 12 to 24 hours, drain, place in sealed bags (1.75 mil for white oak group; 4 mil for red oak group) and place in a cooler at about 34°F. Inspect and rotate bags periodically to drain off excess condensation. If no condensation occurs, add moisture to the bags. Plant as soon as possible after removal from the cooler. Plant white oak group within 6 months. Discard any acorns of the red oak group not planted the next spring or early summer unless the acorns can be stored in carefully controlled temperature and moisture conditions.

Acorns may have up to one insect hole and ¼ of the nut damaged by insects and still be viable. If any nonviable seed is found, the seeding rate will be increased by the percentage of non-viable seed.

Yellow-Poplar

Seed collected by shaking will not be completely dry and should be placed in shallow trays to finish drying. Fall seed or store dry in sealed bags orcans at about 40°F.

Black Walnut

After collection, place seed in burlap or onion sacks to transport. Keep cool and out of sun. If the nuts will be hulled, be sure to complete before the hulls dry.

Old corn shellers or mechanical hullers can be used. Float and wash hulled nuts. Spread to dry or fall plant 2 to 4 inches deep. Stored walnuts should be treated the same as the hickories (see above). Be advised that unhulled nuts will eventually decompose and produce a black liquid that will stain anything it contacts.

Persimmon

As soon as possible after collection, remove the seed from the skin and pulp. Do not let fruit heat and ferment or become moldy. Place in a shallow tray with wire mesh bottoms that will let pulp sift throughout not seeds. Wash and rub fruits to remove most of the pulp and skins. Once clean, spread seeds in shallow trays to dry. Plant in the fall or store dry in sealed containers at about 40° F.

Sycamore

After collection, whether late fall or late winter, the seed balls should be placed in shallow trays and dried until they can be easily broken apart. Rub over a fine screen to remove the fine hairs attached to individual seeds. This is a dusty job, so wear gloves, goggles, and a dust mask. If seeds are to be sown soon after collection, they may be stored in a cool, dry, well ventilated place in open mesh bags or in shallow trays. Crush fruit heads (balls)and rub out seeds for planting.

Other Species

All light seeded species, as well as Kentucky coffeetree, should be kept dry.

Do not allow seed to heat up, avoid storing in large quantities unless well ventilated and refrigerated. Never leave tree seed in the sun.

Site Preparation

Planting sites will be prepared by destroying competing vegetation by either herbicide, or cultivation or both.

Elimination of perennial vegetation (especially sod forming grasses) is critical to seeding establishment. Reed canarygrass, brome, fescue, orchard grass and all warm season grasses must be killed and/or destroyed by tillage. If broadcast seeding the entire site must be treated; if row seeding at least a 2-foot radius circle or 4-foot wide band must be treated, with the planted seed centered in the grass-free area. Depending on the site, it may be necessary to start early in the growing season prior to planned fall planting by spraying regularly with recommended herbicides.

NOTE: West Virginia NRCS does not make pesticide recommendations. Landowners should be instructed to read product labels and follow product specifications. Landowners must contact the West Virginia Division of Forestry or the WVU Cooperative Extension Service for pesticide recommendations.

See WV conservation practice standard Tree/Shrub Site Preparation, code 490.

General Seeding Recommendations

Inspect seed when removing from storage before planting.

Seed may be planted whenever soil is unfrozen and moisture is adequate, but seed will be in best condition shortly after collection. Acorns in the white oak group can not be reliably stored for more than 6 months. Planting in July, August or early September, however, may result in lower survival due to high soil temperatures and potential for rapid loss of soil moisture. If sprouting of seed begins seed can still be successfully planted but risk of dehydration is increased.

If there is no source of light seeded species within 500 feet of any portion of the planting site that portion will receive an additional 1,000 seed per acre of either heavy or light seeded species.

To overcome predation, double the seeding rate for the first 100 feet beyond a forest edge.

Seed may be planted mechanically or by hand, in rows or broadcast. Depth of planting for heavy seeded species will be approximately 2 times the seed diameter, or 2 to 5 inches deep depending upon species.

Plant all species at 2 inches or more if seed predation and/or low soil moisture are anticipated.

Plant at least 3,000 seed per acre of heavy seeded species if row planting; 4,800 if broadcast seeding.

Row seeding can be done with specialized equipment or modified tree planters or corn planters. Broadcast seeding can be done with modified agricultural spreaders.

Light seeded species will be sown on the surface of the soil. Seed that is broadcast will be disked in and cultipacked or rolled.

Conifers

Virginia pine, shortleaf pine, white pine, red pine and pitch pine are possible candidates for direct seeding, although white pine is a slow starter and is strongly affected by plant competition.

Follow these guidelines for successful direct seeding of conifers:

- Use seed treated with a bird, mammal, and insect repellent.
- Use stratified seed. Stratified seed has been stored for 45 to 60 days in moist conditions at 36° to 40° F which is necessary to prepare seed for germination.
- Sow in early spring after an inch or more of rain.
- Broadcast .5 to 1 pound of seed per acre by air or by hand- crank seeder.
- Spot seed .25 to .3 pound of seed per acre in areas of desired spacing. At the same time, choose spots where chances of success are greatest. Three or four seed should be used per spot at 6 feet x 7 feet to 8 feet x 8 feet spacing.

Protection

Protect from livestock and fire. See the conservation practice standards, Use Exclusion, 472 and Firebreak, 394.

Operation and Maintenance

Access by vehicles or equipment during or after tree/shrub establishment shall be controlled to protect new plants and minimize erosion, compaction and other site impacts. Refer to the standard Use Exclusion, 472.

The trees and shrubs will be inspected periodically and protected from adverse impacts including insects, diseases or competing vegetation, fire and damage from livestock or wildlife. The planting should be inspected at least annually and after storm/fire events.

If needed, competing vegetation will be controlled until the woody plants are established. Noxious weeds will be controlled. If pesticides are used, refer to standard Pest Management, 595.

Replanting will be required when survival is inadequate to meet the objective of the practice.

Supplemental water will be provided as needed.

Periodic applications of nutrients may be needed to maintain plant vigor.

After trees and/or shrubs are established, refer to the standards Forest Stand Improvement, 666, and Tree/Shrub Pruning, 660, for subsequent management.

Where practical, management activities will be performed outside the primary nesting season (March 15 - July 15). An exception may be for mowing or cultivation to control vegetative competition.

Pruning, thinning, and/or removal of dead or diseased plants should be performed and timed as to not interfere with the life cycle of the plants or the intended purpose of the planting.

Supplemental water will be provided as needed.

Trees and shrubs will be inspected periodically and protected from adverse impacts including insects, diseases or competing vegetation, fire and damage from livestock or wildlife.

Periodic applications of nutrients may be needed to maintain plant vigor.

Additional operation and maintenance requirements may be developed on a site- specific basis to assure performance of the practice as intended.

Trees and shrubs will be protected against fire, insects, disease and destructive grazing.

Damaging pests will be monitored and controlled.

The practice area should be inspected in the first few months and at least annually including after storm/fire events.

Replace dead and dying stock in newly established plantings. The practice area must be protected from grazing as well as, fire, insects, diseases, competing vegetation and wildlife. Noxious weeds will be controlled.

Where practical, management activities will be performed outside the primary nesting season (March 15 - July 15). An exception may be for mowing or cultivation to control vegetative competition.

Supplemental water as well as periodic applications of nutrients may be needed to maintain plant health and vigor.

Trees and/or shrubs can eventually become crowded slowing their growth, survival and composition of understory species. As the plants mature, periodic harvesting of some of the overstory trees and shrubs becomes an important activity for maintaining plant health and productivity.

Pruning, thinning, and/or removal of dead or diseased plants should be performed and timed as to not interfere with the lifecycle of the plants or the intended purpose of the planting.

Specifications

Site-specific requirements are listed on the following pages of this job sheet. Specifications are prepared in accordance with the WV NRCS Field Office Technical Guide. See the

WV conservation practice standard for Tree/Shrub Establishment, code 612, for specific requirements. Clients should work closely with NRCS personnel and WV Division of Forestry personnel when utilizing this practice.

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NRCS Natural Resources Conservation Service

Tree/Shrub Establishment – WV Job Sheet – Direct Seeding

Client:	**Farm #:**
Field(s):	**Tract #:**
Designed By:	**Date:**
Location:	**Total Acres:**

Purpose of Tree/Shrub Establishment:

Site Conditions Prior to Direct Seeding:

NOTE: A precondition for tree/shrub establishment is appropriately prepared sites. Site preparation is needed if competition from grass, weeds, and/or woody materials will interfere with plant establishment and growth. Refer to practice standard Tree/Shrub Site Preparation, 490 and/or Brush Management, 314, as applicable.

Is Tree/Shrub Site Preparation needed? Yes ☐ No ☐

If yes, see WV conservation practice standard Tree/Shrub Site Preparation, code 490.

Field	Acres	Species[1]	Method [2]	Application[3]	Planting Date	Seeds per Acre	Spacing		Seeds per Spot	Seed Depth (in)	Total Seed	Protection Method[4]
							Row	Seed				

Additional Seeding Requirements: (i.e. equipment needed, cultipacking, raking, etc.)

[1] **Species**: If available, attach USDA Plants Database (http://plants.usda.gov) Fact Sheet or Plant Guide for each species planned

[2] **Method**: List as: **Hand**, **Mechanical** or **Other**

[3] **Application:** List as: **Spot**, **Row** or **Broadcast**

[4] **Protection Method**: List as: **Tree Shelters**, **Repellants**, **Tree Mats**, or **Other**

The following chart shows row spacing and seed spacing combinations that will result in 3,000 seed per acre:

Seed Spacing = (43,560/3,000)/row spacing; Seed/acre = (row spacing X seed spacing)/43,560:			
ROW SPACING	**DISTANCE BETWEEN SEEDS**	**ROW SPACING**	**DISTANCE BETWEEN SEEDS**
6’	2.4’ (29”)	12’	1.2’ (15”)
7’	2.0’ (24”)	13’	1.1’ (13”)
8’	1.8’ (22”)	14’	1.0 (12”)
9’	1.6’ (19”)	15’	1.0’ (12”)
10’	1.5 (18”)	16’	0.9’ (11”)
11’	1.3 (16”)	17’	0.9’ (11”)

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If needed, an aerial view or a side view of the practice can be shown below. Other relevant information, complementary practices and measures, and additional specifications may be included.

Refer to the conservation plan map for location information

Additional Specifications and Notes:

Protection Methods

If used, tree mats and shelters should be installed according to manufacturer guidelines. Shelters should be maintained for a minimum of five years or until they disintegrate naturally. Repellents should be applied according to manufacturer guidelines. Competing vegetation should be removed from around the protected seedlings. Protect from livestock, fire and other damage. See the WV conservation practice standards, Use Exclusion, code 472 and Firebreak, code 394, as appropriate.

Additional requirements:

Questions regarding the planting or maintenance of the Tree/Shrub Establishment should be directed to:

_____ **at**_____